METHOD OF PURGING A PLURAL COMPONENT MIXING AND DISPENSING SYSTEM

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BACKGROUND OF THE INVENTION

The present invention relates to plural component mixing and dispensing systems, and more paticularly to a system and method of operation for producing zero waste of the liquid components fed to the system.

Plural component liquids are typically liquids which are chemically inert in their respective individual states, and chemically reactive when brought together and mixed to form a composite liquid mixture. In the chemically active state, such mixed liquids, commonly comprising a resin component and a catalyst component, are characterized in that they require only a short time interval to become "set" or to solidify. Once such liquids have become solidified they are capable of providing advantageous coatings in the coating materials field, or other advantageous chemical and physical behavior in other fields, depending upon the nature and type of materials being used. For example, such materials are used to provide extremely durable finishes on metals and other materials, they are also used to provide foam insulation for construction projects, and they are also used to provide unique filling and packing materials for furniture, packaging, and other purposes. Because such materials are chemically active when mixed together, they do present a significant problem in handling, particularly when they are utilized in a system which requires intermittent application. Once the materials become mixed together, they must be specially handled during the limited time in which they remain in a relatively fluid state, for once they solidify it is practically impossible to return them to a liquid or fluid state.

In systems for mixing and dispensing such materials, it has been a continual problem to provide application procedures and equipment which do not waste at least some material, particularly during intermittent dispensing operations. The mixing of the two materials must occur prior to the point where they are dispensed, and after the dispensing operation is completed there is therefore always some quantity of mixed material remaining in the dispensing mechanism which must be disposed of. In most cases this material is purged from the system into a waste collector by utilizing solvents as a purging and cleaning solution. This necessitates the need for waste collection containers, and requires that suitable storage and disposal procedures be adopted.

It has been found, that for at least certain types of resin and catalyst components, the setting time for conversion of mixed components into solids is a direct function of the mix ratio of these components. It has been found further that the ratio can be diluted to such an extent to retard the setting time to a time interval considerably longer than the intermittent "off" time of the system when used in such intermittent applications. For example, in a typical plant environment, such application systems may be utilized relatively continuously during the work day, but may then be unused during one or several work shifts when the plant is either closed down, or when other operations are performed not requiring the dispensing of these components. Formerly, this situation would require that the system be completely purged of mixed components and thoroughly cleaned before shutdown, and at the time the system is restarted the system would be again refilled with properly mixed materials to enable the start up of a new dispensing operation.

SUMMARY OF THE INVENTION

The invention comprises a catalyst pumping and delivery system, coupled through a two-way valve to a mixing manifold, and including the capability of providing a recirculation connection from the two-way valve back to the catalyst container. The system further comprises a resin container and pumping system for delivering resin material to the mixing manifold, and a conduit for delivering the mixed material to a dispensing device. The system further comprises a second pumping and delivery system coupled to the resin container for delivering resin through a valve and a closed recirculation loop back to the resin container, the recirculation loop having a connection point for coupling the dispensing device directly into the recirculation loop.

The method of the present invention comprises the steps of sequentially opening and closing the respective valves, and actuating the dispensing device, for recirculating the catalyst material to its container during shutdown, while simultaneously actuating both the resin pumping and delivery system and the resin secondary pump and recirculating system for purging the mixed components in the delivery lines back to the resin tank, under heavy dilution by the addition of additional resin material.

It is therefore a principal object of the invention to provide a mixing and dispensing system having a mixed material purge cycle which yields no waste material.

It is another object of the present invention to provide a mixing and dispensing system whereby start up procedures enable the complete filling of all of the lines leading to the dispensing device without wasting any material.

It is yet another object of the present invention to provide a system for sufficiently diluting the relative mix of catalyst and resin to extend the thermosetting time to an interval longer than the downtime of the system between dispensing operations. These and other objects and advantages of the invention will become apparent from the following specification and claims, and with reference to the appended drawing.

BRIEF DESCRIPTION OF THE DRAWING

The invention is illustrated on the single drawing, which shows a symbolic diagram of a preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, there is shown a catalyst tank **10** and a resin tank **12**. Each of these tanks is of sufficient size to hold quantities of the respective catalyst and resin material to enable dispensing over a considerable length of time, as for example one or two weeks. The catalyst material in tank **10** is chemically inert while it remains in tank **10**, and for so long as it is pumped through lines which do not bring it into contact with the resin material. Similarly, the resin material in tank **12** is chemically inert and remains inert for so long as the material resides in tank **12**, or is pumped over lines which do not bring it into contact with the catalyst material. When such resin and catalyst materials are